Total Maximum Daily Load for Nutrients in the Lower Salinas River and the North Salinas River Lagoon, Monterey County, California

Final Preliminary Project Report

June 2005

Regional Water Quality Control Board
Central Coast Region
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1. PROJECT DEFINITION

This Project Report (Report) addresses impairment of the Salinas River (River) by nutrients. This Report also addresses several tributaries to the River, either in terms of impairment or as a source of impairment to the River.

The Central Coast Water Board completed a Project Definition associated with nutrient 303(d) listings in the Salinas River Watershed (Salinas River Project Definition Report, Central Coast Water Board, June 2004). The Project Definition described two potential projects to address the nutrient listings in the Salinas River Watershed (Watershed). The table below shows the projects, associated waterbodies, and the constituent for which the waterbody was listed.

Table 1.1 Defined projects and associated 303(d) listings.

Project-1	Project-2
Waterbody/Listing	**Waterbody/Listing**
Salinas River (Lower)/Nutrients	Old Salinas River Estuary/Nutrients
Salinas River Lagoon (north)/Nutrients	Tembladero Slough/Nutrients
	Alisal Creek/Nitrate

This Report will address both projects shown in Table 1.1.

Figure 1.1 is a map of the Salinas River as well as some of the tributaries to the River.

Figure 1.1 Salinas River and tributaries.

INSERT MAP

Table 1.2 shows the beneficial uses associated with each water body in Table 1.1.

Table 1.2 Beneficial uses associated with each listed water body.

	SALINAS RIVER (LOWER)	SALINAS RIVER LAGOON (NORTH)	OLD SALINAS RIVERESTUARY	ALISAL CR	TEMBLADERO SLOUGH
MUN	X			X	
AGR	X			X	
GWR				X	
REC1		X	X	X	X
REC2	X	X	X	X	X

WILD	X	X	X	X	X
COLD	X	X	X	X	
WARM	X	X	X	X	X
MIGR	X	X	X		
SPWN		X	X	X	X
BIOL		X	X		
RARE		X	X		X
EST		X	X		X
FRESH	X				
COMM	X	X	X	X	X
SHELL		X	X		X

MUN: Municipal and domestic water supply.
AGR: Agricultural supply.
GWR: Ground water recharge.
REC1: Water contact recreation.
REC2: Non-Contact water recreation.
WILD: Wildlife habitat.
COLD: Cold fresh water habitat.
WARM: Warm fresh water habitat
MIGR: Migration of aquatic organisms.
SPWN: Spawning, reproduction, and/or early development.
BIOL: Preservation of biological habitats of special significance.
RARE: Rare, threatened, or endangered species
EST: Estuarine habitat
FRESH: Freshwater replenishment.
COMM: Commercial and sport fishing.
SHELL: Shellfish harvesting.

1.1. Exceedence of Water Quality Objectives

The Water Quality Control Plan of the Central Coast Region (Basin Plan) describes nutrient-related water quality objectives that must be achieved for the protection of beneficial uses. Nutrient-related water quality objectives associated with protection of the beneficial uses shown in Table 1.2 include:

1. Nitrate-NO_3 water quality objective: 45 mg/L-NO_3 (equivalent to nitrate-N of 10 mg/L-N).
2. Unionized ammonia (NH_3-N) water quality objective: 0.025 mg/L-N.
3. Biostimulatory substances: "Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses."

The nitrate-N and unionized ammonia water quality objectives are numeric, and therefore easily measured against water quality data. The biostimulatory substances objective is a narrative objective and therefore must first be interpreted in order to apply it to numeric data. Aquatic plant growths in coastal streams are most often seen in the form of attached filamentous algae. The United States Environmental Protection Agency (UPEPA) compiled results of research and recommendations and found that algal biomass of greater than 150 mg/m^2 present nuisance conditions in streams. As an aerial coverage, this biomass corresponds to a range from 20%-40% cover (USEPA, 2000).

Table 1.3 is a summary of nitrate-N and unionized ammonia data for the five bodies of water listed in Table 1.1. Two datasets are used in the summary. The Central Coast Water Board contracted with the Central Coast Watershed Studies (CCoWS) of the California State University at Monterey Bay to compile nutrient data. The data compiled by CCoWS was compiled from several entities; data from this dataset was collected in stream from 1999 to 2002. In addition to the CCoWS dataset, Central Coast Water Board staff collected nutrient data during the low-flow season of 2004. This dataset is also included in Table 1.3. Note that the CCoWS dataset does not include unionized ammonia data.

Table 1.3 Nitrate-N and unionized ammonia summary data.

Nitrate-N Data						
	CCoWS Dataset (1999-2002)			Water Board Dataset (2004)		
	n	#Exceedences	%	n	#Exceedences	%
Salinas River Estuary	48	27	56	14	12	86
Salinas River Lagoon	25	6	24	8	7	88
Salinas River	86	5	6	23	10	43
Tembladero Slough	38	31	82	14	14	100
Alisal Creek	21	13	62	2	1	50
Unionized Ammonia Data						
	CCoWS Dataset (1999-2002)			Water Board Dataset (2004)		
	n	#Exceedences	%	n	#Exceedences	%
Salinas River Estuary	no data	no data	no data	13	4	31
Salinas River Lagoon	no data	no data	no data	7	2	29
Salinas River (Lower)	no data	no data	no data	18	2	11
Tembladero Slough	no data	no data	no data	12	9	75
Alisal Creek	no data	no data	no data	1	0	0

n: the number of data
#Exceedences: the number of data that exceeded the objective for nitrate-N or unionized ammonia.
%: the percent of data that exceeded the nitrate or unionized ammonia objective.

Note from Table 1.3 that all five bodies of water have exceedences of the nitrate-N water quality objective. Both CCoWS dataset as well as the Water Board dataset indicate exceedences in the five bodies of water. Recall, however, that the nitrate-N water quality objective of 10 mg/L-N is for the protection of the MUN beneficial use. The Salinas River and Alisal Creek are the only bodies of water listed in 1.3 that are to support the MUN beneficial use (see Table 1.2). The MUN beneficial use is therefore not being supported in these two water bodies.

The Water Board dataset shows that exceedences of the unionized ammonia objective occur in four of the five water bodies. All bodies of water, excepting Alisal Creek, have exceedences of the unionized ammonia water quality objective. Since the unionized ammonia objective applies to all bodies of water, the Salinas River Estuary, the Salinas River Lagoon, the Salinas River, and the Tembladero Slough are all impaired due to elevated levels of unionized ammonia.

Central Coast Water Board staff collected benthic algal data in units of aerial cover. Table 1.4 shows summary data of benthic algae data. Recall from the interpretation of the narrative biostimulatory objective that aquatic growths are at nuisance levels when in a range greater than 20%-40% aerial cover.

Table 1.4 Summary of aerial cover of benthic algae.

Water Body	Number of data	Minimum Cover (%)	Maximum Cover (%)	Median Cover (%)
Salinas River Estuary	13	0	0	0
Salinas River Lagoon	7	0	2	1
Salinas River	22	0	0	0
Alisal Creek	3	0	15	0
Tembladero Slough	14	0	0	0

Note in Table 1.4 that algal cover did not rise above the 20-40 percent threshold in any of the bodies of water. Algal levels tend to peak in late summer and early fall yet maximum cover did not exceed the 20-40 percent threshold during any of these months; data was collected from April through November. Therefore, none of the five bodies of water listed in Table 1.4 are impaired due to exceedence of the biostimulatory objective.

1.2. Problem Statement

The following summarizes the impairments and exceedences of water quality objectives with respect to nutrients in the lower Salinas River area.

1. Salinas River Estuary
   a. Impaired due to exceedence of the water quality objective for unionized ammonia.
2. The Salinas River Lagoon
   a. Impaired due to exceedence of the water quality objective for unionized ammonia.
3. The Salinas River (Lower)
   a. Impaired due to the exceedence of the water quality objective for nitrate-N; as a result, the MUN beneficial use is not being supported.
   b. Impaired due to exceedence of the water quality objective for unionized ammonia.
4. Alisal Creek
   a. Impaired due to the exceedence of the water quality objective for nitrate-N; as a result, the MUN beneficial use is not being supported.

5. Tembladero Slough
    a. Impaired due to exceedence of the water quality objective for unionized ammonia.

2. WATERSHED DESCRIPTION

The 303(d) listings addressed in this report are illustrated in Figure1.1. The Salinas River (Lower) refers to the main stem of the Salinas River beginning at Gonzales Road continuing downstream to the Salinas Estuary. The Salinas River (Lower) will be referred to as the Salinas River in this report. The Salinas River and tributaries to the Salinas River can be subdivided into two subwatersheds, which in turn are divided into several subwatersheds. The Salinas River Lagoon and the Salinas River Estuary are the two receiving water bodies for the subwatersheds. Table 2.1 shows the subdivision into two main receiving water bodies and the tributaries to these receiving water bodies.

Table 2.1 Receiving water bodies and tributaries.

Receiving Water Body	
Salinas River Lagoon	**Salinas River Estuary**
Subwatersheds to the receiving water bodies	
Salinas River	Tembaldero Slough
Blanco Drain	Espinosa Slough
	Gabilan Creek
	Natividad Creek
	Salinas Reclamation Canal
	Alisal Creek
	Chualar Creek

Figure 2.1 illustrates the subwatersheds listed in the table above.

INSERT MAP OF RECEIVING WATERS AND TRIBS

Figure 2.1 Salinas River Lagoon, Salinas River Estuary, and their tributaries.

2.1. Land Use

Land uses within the subwatersheds are estimated using National Land Cover Data (NLCD). The NLCD is provided by the Multi-Resolution Land Characteristics Consortium (MRLC, 1992), which included the United State Geological Survey (USGS), the Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA),the U.S. Forest Service (USFS), the National Atmospheric and Space Administration (NASA), and the Bureau of Land Management (BLM). The NLCD was derived from images taken by Landsat's Thematic Mapper sensor. The land use categories are aggregated based on a level II classification scheme of the NLCD.

The resulting land use categories and corresponding acreage for each category are shown in Table 2.2.

Figure 2.2 Land use acreage derived from MRLC.

Watershed	Total Watershed Acreage	Agriculture	Bare	Developed	Forest	Grassland	Quarries	Shrub	Water Feature/ Wetland
Old Salinas River Estuary	1,463	1,195	40	62	1	10		145	10
Tembladero Slough	16,737	5,325	216	2,040	1,985	4,039	26	2,907	199
Salinas Reclamation Canal, Lower	6,562	3,669	110	2,269	1	374		139	
Salinas Reclamation Canal, Upper/Alisal Creek	29,602	11,637	479	2,339	2,868	6,552		5,719	8
Espinosa Slough	8,647	7,007	133	674	72	598		80	83
Salinas River Lagoon, North	3,058	2,160	306	105	13	127		200	147
Salinas River	40,595	23,622	1,102	2,646	558	10,856	72	1,601	138
Blanco Drain	8,300	7,702	87	393	1	66		51	
Alisal Slough Remnant (Rec Canal)	3,704	3,514	51	127		8		4	
Gabilan Creek	27,713	3,559	140	781	7,167	9,657	321	6,083	5
Natividad Creek	7,405	3,583	63	281	840	1,917	19	685	17
Quail Creek	11,238	2,429	420	186	2,030	1,847		4,325	1
Chualar Creek	29,877	7,946	335	151	4,882	10,039		6,517	7
Totals	194,901	83,348	3,482	12,054	20,418	46,090	438	28,456	615

Figure 2.3 Land use proportions of subwatersheds.

Watershed	Agriculture (%)	Bare (%)	Developed (%)	Forest (%)	Grassland (%)	Quarries (%)	Shrub (%)	Water Feature/ Wetland (%)
Old Salinas River Estuary	82	3	4	< 1	1		10	1
Tembladero Slough	32	1	12	12	24	< 1	17	1
Salinas Reclamation Canal, Lower	56	2	35	< 1	6		2	
Salinas Reclamation Canal, Upper/Alisal Creek	39	2	8	10	22		19	< 1
Espinosa Slough	81	2	8	1	7		1	1
Salinas River Lagoon, North	71	10	3	< 1	4		7	5
Salinas River	58	3	7	1	27	< 1	4	< 1
Blanco Drain	93	1	5	< 1	1		1	
Alisal Slough Remnant (Rec Canal)	95	1	3		< 1		< 10	
Gabilan Creek	13	1	3	26	35	1	22	1
Natividad Creek	48	1	4	11	26	< 1	9	< 1
Quail Creek	22	4	2	18	16		38	< 1
Chualar Creek	27	1	1	16	34		22	< 1
% of Total	43	2	6	10	24	< 1	15	< 1

Note that with the exception of Chualar and Gabilan Creek subwatersheds, agriculture is the dominant land use. Figure 2.4 illustrates the land use categories over the watershed area.

FIGURE OF LAND USES

Figure 2.4 Land uses in the lower Salinas River watershed.

2.2. Hydrology

Some of the surface waters in the watershed are perennial, while some are ephemeral. The Salinas River is dry during the late summer months upstream of Davis Road (near the City of Salinas). Alisal Creek is also dry during summer months. In contrast, the Salinas Reclamation Canal, Tembladero Slough, the Salinas Lagoon, and the Salinas

Estuary are perennial; summer flows in these bodies of water are attributed to ground water and irrigation sources.

Sources of water in the surface waters include precipitation, releases from reservoirs, groundwater, and return flows from agricultural irrigation. Figures 2.5 and Figure 2.6 illustrate the discharge in the Salinas River and the Salinas Reclamation Canal (data obtained from USGS website).

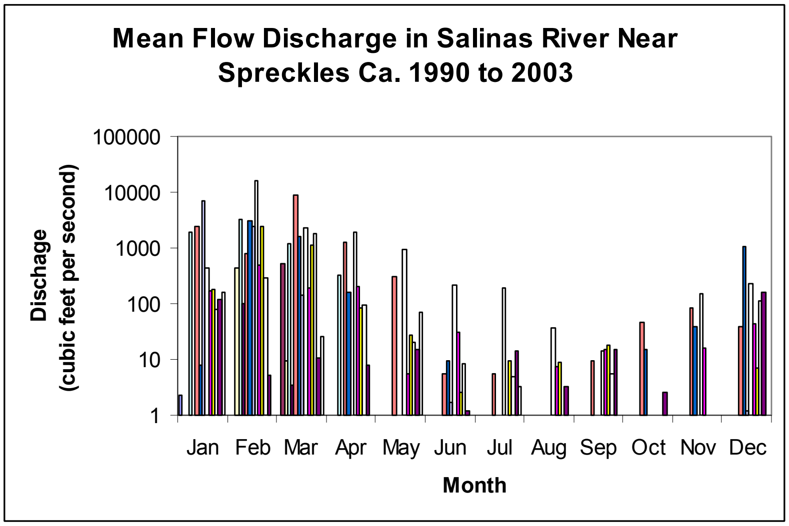

Figure 2.5 Mean flow discharge by month in the Salinas River at Spreckles from 1990 to 2003.

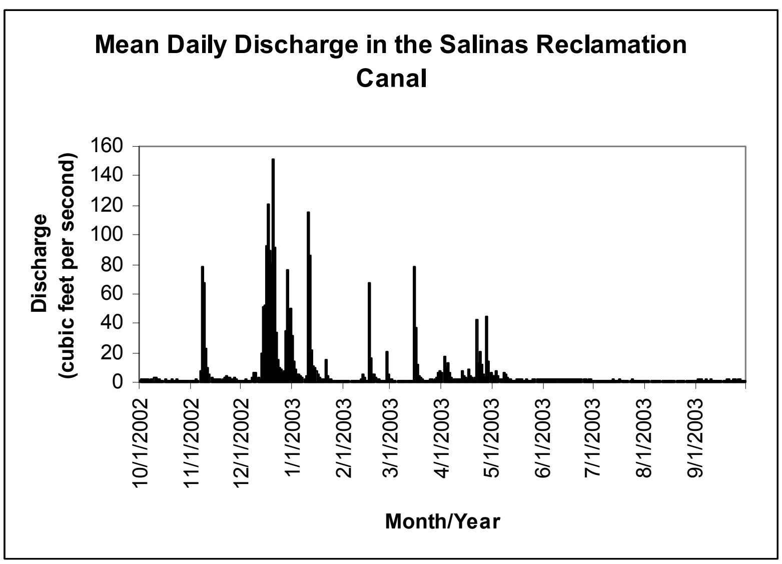

Figure 2.6 Mean flow discharge by month in the Salinas Reclamation Canal in 2002 to 2003.

Figures 2.5 and 2.6 illustrate the effect of precipitation on flow during the winter months. Flows during the summer and early fall are attributed to inputs from irrigation and ground water sources.

Two impervious layers separate groundwater aquifers in the lower Salinas valley (from Gonzales downstream to the river mouth). The upper clay layer lies from ten to twenty feet below the surface. The upper clay layer restricts percolating water from entering the deeper aquifer, thereby causing movement of water between the upper groundwater and surface waters, e.g. the Salinas River and its tributaries. As such, ground water sources to area water bodies are probable. However, it is probable that much of the water percolating through the soil profile during summer months originates from irrigation.

3. DATA ANALYSIS

Three sources of water quality data are used for this report. One data set is the result of staff's monitoring efforts during the low flow season of 2004. The second data set is the compilation of data from several agencies that was summarized in a 2003 report created by Central Coast Watershed Studies (CCoWS) (Anderson *et al*, 2003). Data from monitoring reports associated with NPDES permits and Waste Discharge Requirements (WDR) will also be considered.

Land use data is described in Section 2.1. GIS layers are developed from the NLCD data and are used in the source analysis. In addition, work done in conjunction with the Salinas River area pesticide/priority organics TMDL will be used in a weight of evidence approach in the source analysis of this TMDL.

3.1. Water Quality Data

Central Coast Water Board (CCWB) staff (staff) began low flow data collection in April 2004 and ended monitoring efforts in November 2004. The main stem of the lower Salinas River was sampled, as well as two canals conveying agricultural tail water to the Salinas River. The objective of monitoring was to determine which nutrient constituents are exceeding numeric objectives and the degree exceedence. Specifically, it is clear from historic data that the nitrate-N water quality objective is being exceeded. However, historic data is not clear whether the unionized ammonia objective is being exceeded. Results from monitoring efforts are also used to support a source analysis. Data collection during the low flow season also helps to determine the level of exceedence; dilution from precipitation is minimal during this period, resulting in higher concentrations relative to wet months.

Table 3.1 shows the monitoring sites used to collected data during the 2004 low flow season. The map in Figure 3.1 illustrates the locations of the monitoring sites. The monitoring sites illustrated by a diamond are those visited monthly. Sites depicted by a cross were visited intermittently.

Table 3.1 Monitoring sites used by Central Coast Water Board staff during 2004 low flow collection.

ProjectID	CCAMPid	LatDD	LongDD	WATERBODY	LOCATOIN	PURPOSE OF SITE
SAL-GON	309SGO	36.487222	121.469166	Salinas River	Salinas River at Gonzales Rd.	Salinas River upstream of SAL-CHU draining agricultural lands. Northern most extent of listing.
SAL-CHU	309SAC	36.5556	121.5486	Salinas River	Salinas River at Chualar River Rd.	Salinas River upstream of SAL-DAV draining agricultural lands.
SAL-DAV	309DAV	36.646667	121.7025	Salinas River	Salinas River at Davis Rd.	Salinas River upstream of SAL-BLA draining

						agricultural lands.
SAL-BLA	309SBL	36.678056	121.745277	Salinas River	Salinas River at Blanco Rd.	Receiving agricultural drainage, site above Blanco drain confluence
BLA-COO	309BCO	36.69838565	121.734747	Blanco Drain	Blanco Drain at Cooper Rd. near intersection with Nashua Rd.	Blanco Drain drains into Salinas River upstream of SAL-MON, drains agricultural lands on all sides
SAL-MON	309SBR	36.731111	121.7452778	Salinas River	Del Monte Rd.	Below confluence with Blanco Drain
OLS-MON	309OLD	36.772291	121.787855	Old Salinas	Monterey Dunes Colony Rd.	Salinas River site just upstream of confluence with Tembladero Slough
TEM-PRE	309TEM	36.765	121.75917	Tembladero Slough	Preston Rd. in Castroville	Upstream of TEM-MOL. Drains agricultural lands on all sides
TEM-MOL	309TDW	36.772183	121.786597	Tembladero Slough	Molera Rd. near intersection w/Monterey Dunes Colony Rd.	Last site of Tembladero slough before drains into Old Salinas. Drains agricultural lands on all sides.
OLS-POT	309POT	36.79055116	121.7905511	Old Salinas	Potrero Rd. at tidegates	Downstream of confluence with Tembladero Slough
309SDR	309SDR	36.646667	121.7025000	Salinas River	Pipe outlet on Davis Rd.	Corrugated pipe outlet to Salinas
SDR-PUM	309PUM	36.690000	121.6600000	Pump to Salinas R.	Pump Station off Blanco Rd	This is the City's pump station off Blanco Road.

INSERT MAP FROM DATA ANALYSIS REPORT SHOWING MONITORING SITES

Figure 3.1 Monitoring sites during 2004 low-flow season

The CCoWS data set includes data from 25 sites ranging in time from February 1970 to November 2003. The data compiled originated from several sources, including: 1) Central Coast Ambient Monitoring Program (CCAMP), which is the ambient monitoring program of the Central Coast Water Board, 2) USGS, and 3) CCoWS. The data compilation from CCoWS is not uniform in time or frequency; some data was gathered from sites only during a single month or year, while other sites have data ranging over several years. Using the entire data set could bias analysis. Therefore, only wet weather data will be used from the CCoWS dataset. The wet weather data is considered from October 30 to March 19 for the years 1999 through 2003. The CCoWS wet weather data and the CCWB dry weather data can be compared to determine if seasonal differences in nutrient levels occur. Figure 3.2 illustrates how the CCoWS data set is spread over time, note that the wet weather data is spread over the months of October to March for the years of 1999 to 2003.

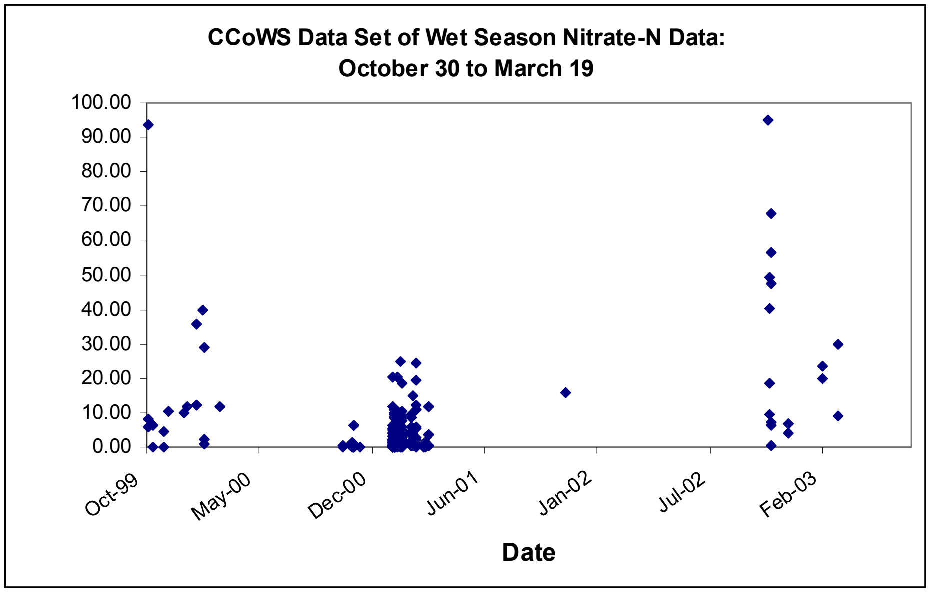

Figure 3.2 Temporal graphic display of wet weather portion of CCoWS data set.

Table 3.2 is a summary of the stream water quality data used in the analysis of this report.

Data Source	# of sites	# of data	Season	Constituent	Minimum Date	Maximum Date
CCWB[1]	9	59	Dry	Nitrate-N	4/2004	11/2004
CCWB	10	51	Dry	Unionized ammonia-N	6/2004	11/2004
CCoWS[2]	31	338	Wet	Nitrate-N	11/1/1999	11/6/2003

[1] Central Coast Water Board
[2]Central Coast Watershed Studies

3.2. Flow Data

TMDLs are often expressed as a mass load of the pollutant but can be expressed as a unit of concentration (40 CFR 130.2(i)). Flow data are used in TMDL analysis to estimate mass loading and thereby estimate relative loading from identified sources. This TMDL is expressed as a concentration. Relative loading will be estimated using a weight of evidence approach. Therefore, flow data is not used in the analysis of the TMDL.

3.3. Data From Regulated Discharges

The Central Coast Water Board receives data from regulated discharges of point and nonpoint sources. Nutrient related data has been compiled from monitoring reports associated with permits and discharge requirements. Eleven discharges to land and one point discharge have been identified in the subject area. Data from these facilities is used in the source analysis.

Point Discharges

There are five regulated point discharges in the project area that discharge either directly to a surface water body or to the storm drain system. Three of the discharges are regulated by a general low threat discharge permit under the National Pollutant Discharge Elimination System (NPDES), permit CAG993001. The other two discharges have individual NPDES permits. In addition, the City of Salinas has a Phase 1 Stormwater NPDES permit.

The five NPDES permitted facilities are listed in the table below.

FACILITY	ADDRESS	CITY	ORDER	NPDES	Discharges to
Cool Pacific Land Co.	AIRPORT BLVD	SALINAS	01-119	CAG993001	Salinas Reclamation Canal, Upper/Alisal Creek
UNI-KOOL Salinas Facility	395 WEST MARKET ST	SALINAS	01-119	CAG993001	Salinas Reclamation Canal, Upper/Alisal Creek
Uni-Kool Co. – Abbott Street	E. John St. & Abbot St (320 John St.)	Salinas	99-068	CA0005720	Salinas Reclamation Canal, Upper/Alisal Creek
P&O Cold Logistics	950 S. Sanborn Rd.	Salinas	01-119	CAG993001	Salinas Reclamation Canal, Upper/Alisal Creek
Growers Ice Company	1060 GROWERS ST	SALINAS	01-016	CA0008069	Salinas Reclamation Canal, Upper/Alisal Creek

Cool Pacific Land Company

Cool Pacific Land Company discharges less than 750 gallons per day of condensation from refrigeration equipment. The condensation is discharged to the storm drain, which in turn is discharged to the Salinas Reclamation Canal, which ultimately flows to the Old Salinas River Estuary. Discharge from Cool Pacific is considered a low threat to water quality; no monitoring of nutrients is required.

Uni-Kool Company

The Uni-Kool Company – West Market Street facility in Salinas discharges up to 5,000 gallons per day of cooling tower water and evaporative condensate to the Salinas Reclamation Canal and Upper/Alisal Creek via the City of Salinas' storm water system.

The discharge is regulated through a general, low threat permit. Monitoring reports were reviewed for this facility by staff.

The Uni-Kool Company discharges wastewater from washing, icing, and the cooling of vegetables. There are two discharge sites, one at Market Street, the other at Abbot Street, both of which are in the city of Salinas. Both discharges discharge to the Salinas Reclamation Canal that flows to the Old Salinas River Estuary. There are two NPDES permits regulating the discharges. Effluent discharge at the Market Street discharge point is 5000 gallons per day, whereas the Abbot Street discharge is 100,000 gallons per day (these are estimates only, discharge is not metered). Nitrogen species in the effluent is monitored at the Abbot Street discharge semi-annually. Effluent nitrate-N concentration in June 2004 was at 5.8 mg/L-N, and 5.9 mg/L-N in September 2004. Total kjeldahl nitrogen was at 2.5 mg/L-N in June, and 1.8 mg/L-N in September 2004. Total nitrogen was 7.7 mg/L-N in September 2004. Unionized ammonia is not monitored. NH3 SHOULD BE MONITORED. FLOW SHOULD BE METERED. THIS FACILITY MAY NEED TO COME INTO THE IMPLEMENTATION.

P&O Logistics

The P&O Cold Logistics facility (formerly CS Integrated, LLC) at 950 S. Sanborn Rd., Salinas, is permitted to discharge up to 40,000 gallons per day of well water used for cooling. P&O discharges three days per week into the Salinas Reclamation Canal, Upper/Alisal Creek via the City of Salinas's storm water system. The discharge is regulated through a general, low threat permit. Effluent monitoring requirements do not include monitoring nitrogen species.

Growers Ice Company

Grower's Ice Company's current permit allows for the discharge of up to 50,000 gallons per day from the following activities/equipment: ice manufacturing, evaporative condensers, ice injectors and vacuum tube pre-cooling. The effluent is discharged to the Salinas Reclamation Canal, Upper/Alisal Slough via the City of Salinas' storm water drainage system under an individual NPDES permit.

As of June 19, 2002, the handling of the facility's effluent has been changed. During the dry season, the effluent is pumped into the City of Salinas' Industrial WWTP. Therefore, there is no discharge during this time. During the wet season the connection to the WWTP is closed and storm water is directed to the storm water drainage system. During this time, effluent will be commingled with storm water discharge, although operations slow down significantly between November and March. Monitoring reports indicate that no discharge occurred other than through the Salinas Industrial WWTP during 2004.

Non-point Discharges

The Bluffs

This facility provides treatment and discharge of domestic wastewater from residential housing. The Bluffs is located at corner of Davis Road and Reservation Road on a bluff approximately 100 feet above the Salinas River. Distance to the Salinas River is 0.7 miles. The discharge is to seepage pits and leach fields. Depth to groundwater is 60-100 feet beneath leach fields, and greater than 50 feet below seepage pits. There is currently no surface or ground water monitoring associated with this waste discharge requirement.

Potential loading of nitrogen or ammonia to the Salinas is negligible based on the depth to groundwater.

California Utilities STP

The California Utilities STP discharges treated domestic wastewater sprayed over a 31-acre field adjacent to Salinas River off Davis Road. The capacity of the facility is 450,000 gallons per day (GPD), with an average daily discharge of 300,000 GPD. Distance to groundwater is greater than 2 feet, with an average distance 15 feet in March 2005.

Effluent monitoring in from April to September 2004 indicates NO_3-N levels are less than 0.15 mg/L-N and TKN ranges from of 1.7-7.3 mg/L-N. Ground water data from 2003 to 2004 data indicate groundwater nitrate-N concentration upgradient of the spray fields reaches as high as 69 mg/L-N in August and 33 mg/L-N in March. Ground water nitrate-N concentration downgradient of the spray fields reaches a maximum of 0.48 mg/L-N in March, and 0.23 mg/L-N in August. Groundwater TKN concentration reached a maximum of 2.6 mg/L-N in the downgradient well for the 2004 and 2005 data collection periods; 2004 data is not available. Groundwater unionized ammonia is not monitored.

Chualar WWTP

The Chualar wastewater treatment plant (WWTP) treats domestic wastewater that is discharged to land via infiltration ponds. The infiltration ponds are located about 700 feet east of the Salinas River and are designed for a 100 year rain event. Discharge is about 75,000 GPD, with a design capacity of 112,000 GPD. Depth to ground water is 10-25 feet, depending on the well and season.

Effluent data from infiltration ponds in 2004 monitoring indicates nitrate levels range from non-detect to 0.2 mg/L-N in 2004, TKN ranges from 23.6 to 50.4 mg/L-N. There are two monitoring wells, one upgradient and another downgradient of the infiltration ponds. The upgradient monitoring well carried nitrate-N concentration of 0.9 mg/L-N and TKN of 23.6 mg/L-N in August 2004. The downgradient well was dry at this time. The downgradient monitoring well carried nitrate-N concentration of 15 mg/L-N and TKN of 13 mg/L-N in March 2004. There is no data for the upgradient well for March 2004. Data is insufficient to determine the affect the infiltration water is having on shallow ground water and the adjacent Salinas River. Unionized ammonia data is not collected from groundwater wells. WE NEED GW AMMONIA DATA AND OVERALL MORE CONSISTENT GW MONITORING.

Gallo Cattle Company

The Gallo Cattle Company discharges animal waste on 64 acres seeded with hay. A holding is pond, with a capacity of 58.22 acre-feet, is used to hold spray water before spraying. The facility has an animal capacity of 30,000 head of cattle. Gallo Cattle Company is located east of Gonzales and nearly 10 miles east of the Salinas River.

Gonzales WWTP

The Gonzales WWTP treats domestic wastewater from the City of Gonzales. The wastewater is treated and discharged to land via infiltration ponds adjacent to the Salinas River. The ponds are located as close as 500 feet from the Salinas River. Levees containing the ponds are designed for a 100-year rain event. Depth to ground water is 10-15 feet. Approximately 0.55 MGD is treated during the summer. There is no effluent data for nitrogen species. Three ground water wells are monitored semi-annually. The most upgradient well of the disposal area had a median nitrate-N concentration of 12.75 mg/L-N, with TKN concentration of 2.4 mg/L-N from 2003-2005. The most downgradient monitoring well carried median nitrate-N concentration of 0.3 mg/L-N and TKN median concentration of 1.7 for the same period. Shallow well data up and down gradient of the percolation ponds indicates that the discharge has a net dilution affect on ground water nitrate-N concentration. However, the most upgradient well may be within the percolation zone and may not be purely upgradient groundwater. Unionized ammonia data is not available.

Las Palmas (aka California-America Water Co.)

The Las Palmas treatment plant treats domestic wastewater for a housing development. The treated wastewater is spray irrigated over a 41-acre site off River road, adjacent to the Salinas River near Spreckels. Capacity is 195,000 GPD. Total nitrogen concentration in effluent from February to September 2004 ranged from 9.8 to 28.0 mg/L-N. Three ground water wells located near the irrigation site are monitored semi-annually in January and July; it is unclear whether any of the well locations are truly upgradient of the infiltration zone, considering the location relative to the discharge site. Well data from 2004 and 2005 indicate a general trend of increasing total nitrogen in the downgradient well, relative to the most upgradient well. The most upgradient well had a total nitrogen concentration in 2004 of 0.9 mg/L and the downgradient well had a total nitrogen concentration of 47.6 mg/L. However, the well depth of the most downgradient well is about 24 feet, whereas upgradient well depth is over 60 feet and is therefore deeper than the clay layer separating shallow and deep groundwater (see discussion Section 2.2). Additionally, it is unlikely that the nitrate-N concentration of 47.6 mg/L-N resulted from the discharge because total nitrogen of the effluent was 18 mg/L-N. This indicates that nitrate-N concentration in the downgradient well may be influenced by more than the Las Palmas discharge.

Monterey Dunes Colony WWTP

The Monterey Dunes Colony WWTP treats and disposes up to 36,000 GDP of domestic wastewater. The wastewater is discharged to several leach fields that are 14 feet deep. The leach fields are located on rolling sand dunes. Depth to groundwater is about ten feet. Groundwater is intruded by seawater at the location. The Old Salinas River is located about one quarter mile east of the leach fields. Nutrient monitoring is not required from the effluent or groundwater.

Monterey Regional Water Pollution Control Agency (MRWPCA), and the Monterey County Water Resources Agency (aka Castroville Seawater Intrusion Project)

MRWPCA collects and treats wastewater from northern Monterey County. The owners and benefactors of MRWPCA include the cities of Monterey, Pacific Grove, Seaside, Del Ray Oaks, Sand City, Salinas, the Marina Coast Water District, and Castroville and Moss Landing County Sanitation Districts. The MRWPCA holds both an NPDES permit (regulating the ocean discharge) as well as a Waste Discharge Requirements (WDR) that regulates reused water. The facility is located in Marina.

The Monterey County Water Resources agency (Castroville Project) receives tertiary treated wastewater from MRWPCA during dry months that is used as irrigation water on 12,000 acres in Castroville.

MRWPCA has a maximum capacity of nearly 30 MGD. The median effluent discharge in 2004 was 4.9 MGD. Secondary treated wastewater is discharged to the ocean during wet months. The tertiary treated wastewater is transported to Castroville for the Castroville Project. The recycled water (in Castroville) is regulated under Recycled Water User Requirements issued to the Monterey County Water Resources Agency (MCWRA).

Monitoring is conducted by MRWPCA as required by their NPDES permit as well as the WDR. The monitoring requirements of the WDR, for the reused water, do not include nutrient constituents. In addition, no groundwater monitoring is required. Monitoring requirements for the NPDES permit, for water discharged to the ocean, does include nutrient constituents. This data may reflect the nutrient concentration of the tertiary treated water being diverted to the Castroville Project. Table 3.2 shows a summary of the 2004 data collection effort.

Table 3.2 Monitoring data from MRWPCA for secondary treated wastewater.

	Effluent	NH3-N	Nitrate-N	Ortho-P	Recycled
	MDG	mg/L	mg/L[1]	mg/L[1]	MG
Jan-04	20.8	33	-0.1	-0.1	0
Feb-04	21.1	29.1	-1	-1	0
Mar-04	8.7	30.8	2	5	16.5
Apr-04	1	32.5	0.7	2.7	19.9

May-04	0.32	30.8	-0.1	2.8	20.6
Jun-04	0.2	31.9	0.76	1.78	20.7
Jul-04	0.4	31.2	0.41	1.71	20.6
Aug-04	0.5	31.3	-0.43	-1	20.6
Sep-04	1.1	31.9	-0.43	1.64	19.7
Oct-04	11.9	31.4	2	2.67	14.1
Nov-04	19.7	31.4	-0.43	2.35	0
Dec-04	19.4	31.4	1	1.35	0
MEDIAN	4.9	31.4	0.155	1.745	18.1

[1]A negative value indicates concentration below the detection limit.

The data indicates that the majority of the nitrogen is in the form of ammonia whereas nitrate-N is the second most prominent form. The tertiary treatment may result in changes of nitrogen form. Also note during the summer months nearly 21 million gallons per day is reused for the Castroville Project.

Salinas Industrial WTP

The Salinas Industrial Water Treatment Plant treats industrial wastewater from vegetable packers and processors, seafood processors, preserve manufacturers, a spice and a box company. The discharge is treated through aeration ponds and is discharged to disposal beds located north of Davis Road and adjacent to the Salinas River. The inflow capacity of the facility is 4 MGD, the daily average is from 2-3 MGD.

Monitoring requirements include nitrogen species for effluent and receiving water (ground water). Table 3.3 shows effluent and groundwater data for this facility.

Table 3.3 Salinas Industrial Water Treatment Plan monitoring data.

		Effluent Data[0]				
Date	Influent	NO2-N	NO3-N	TKN-N	TN-N[4]	
	MGD[1]	mg/L	mg/L	mg/L	mg/L	
Nov-03	2.31	0.68	0.9	18.9	20.5	
Apr-04	2.58	nd	nd	16.3	16.3	
Oct-04	2.93	1.36	0.38	13.8	15.5	
Apr-05	2.7	-0.22	-0.22	5	5	
		Groundwater Data				
		NO2-N	NO3-N	TKN-N	TN-N	DEPTH
Date	Well	mg/L	mg/L	mg/L	mg/L	FT
Nov-03	U[2]	-0.22	0.4	1.9	2.3	
Nov-03	D[3]	0.28	7	0.9	8.2	
Apr-04	U	-0.22	-0.22	2.1	2.1	
Apr-04	D	0.26	3.75	-0.22	4	
Oct-04	U	-0.22	-0.22	1.2	1.2	
Oct-04	D	0.26	5.1	0.7	6.7	
Apr-05	U	-0.22	-0.22	0.8	0.8	10.9
Apr-05	D	-0.22	1.2	0.3	1.5	8.75

[0]Negative values indicate non-detect; values are negative half the detection limit.
[1]Millions of gallons/day.
[2]Upgradient of discharge.
[3]Downgradient of discharge.
[4]TN is Total Nitrogen.

The data indicate that most of the nitrogen present in the effluent and the well upgradient of the discharge ponds is in total kjeldahl nitrogen (TKN). However, most of the nitrogen in the downgradient well is in the nitrate-N form. In addition, the total nitrogen of the downgradient well is higher than the total nitrogen content of the upgradient well. It is possible that the TKN nitrogen in the effluent is being converted to nitrate-N, resulting in the higher nitrate-N concentration in the downgradient well, relative to the upgradient well. However, another nitrogen source may be complicating the analysis, as evidenced by the higher in total nitrogen concentration in the downstream well, relative to the upstream well. Unionized ammonia is not monitored. CONSIDER UNIONIZED AMMONIA MONITORING.

San Jerardo WWTP

San Jerardo Cooperative is a housing facility for farm workers. The wastewater treatment facility treats domestic wastewater for 63 dwellings, a store, and a Headstart school. The capacity of the facility is 40,000 gallons per day. Wastewater is treated through aeration and settling. The partially treated wastewater is then discharged to ponds for infiltration and evaporation. The discharge is located approximately two and a half miles east of the Salinas River near Old Stage Road and Spence Road. A tributary to Alisal Creek is adjacent to the facility.

Effluent is monitored semiannually for nitrite, nitrate, TKN, and total nitrogen. Groundwater is not monitored. All effluent nitrogen was in the form of TKN during April 2004, September 2004, and March 2005 monitoring events. TKN ranged from 4.6 mg/L-N to 29 mg/L-N. Effluent flow during September 2004 was 23,172 MGD. There is no groundwater data available from this facility.

3.4. River/Creek Data

Data is presented on a subwatershed bases, with individual monitoring sites located in various subwatersheds. Figure illustrates the subwatersheds.

INSERT SUBWATERSHED MAP
Arroyo Seco, Chualar, Esperanza, Quail, Alisal, Gabilan, Rec Canal, Espinosa Sl, Tembladero Sl, Blanco Dr., Salinas Lower, Salinas River Lagoon, Ols Sal Riv Estuary

Figure 3.3 Subwatersheds

Arroyo Seco

The Arroyo Seco subwatershed is located in the headwaters of Los Padres National Forest, west of the Salinas River. The Arroyo Seco River flows through the city of Greenfield, and has a confluence with the Salinas River approximately seven miles downstream of Greenfield and 8.7 miles upstream of the city of Gonzales.

Land uses in the upper Arroyo Seco are dominated by forest and grasslands. Monitoring sites upstream of the Greenfield are considered natural areas, and therefore water quality data gathered from these areas are considered reflecting reference conditions. Monitoring site ARR-CAM is surrounded by forested areas. Monitoring site ARR-ELM is surrounded by grasslands.

Table 3.4 Arroyo Seco concentration data.

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source	Season
ARR-CAM	0.05 (4)	na	CCoWS	Wet
ARR-ELM	0.04 (7)	na	CCoWS	Wet
309SEC	0.001(11)	0.001 (11)	CCWB[1]	Dry/wet

[1]CCWB samples from ambient monitoring data taken from July 1999 to February 2000.

The data in Table 3.4 is indicative of the background concentrations of nitrate-N and unionized ammonia in the upper portions of the watershed. Nitrate-N concentrations in the Arroyo Seco are in some cases three orders of magnitude lower than concentrations in other more impacted parts of the watershed.

Chualar

The headwaters of Chualar Creek are located in the Gabilan Range east of the City of Chualar. The subwatershed is approximately 22,486 acres.

Natural lands with some pockets of grazing and residential land use dominate the upper portions of the subwatershed. The lower part of the watershed is dominated by irrigated agriculture. Chualar Creek is ephemeral upstream of agricultural land use and perennial downstream of agricultural land use.

Monitoring site CHU-CCR is in Chualar Creek downstream of natural areas. Some pockets of grazing and residential occur upstream of the monitoring site. Site CHU-CRR is near the confluence with the Salinas River and is located downstream irrigated agricultural activities.

Table 3.5 shows concentration data from these monitoring sites.

Table 3.5 Chualar Creek water quality data.

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source	Season
CHU-CCR	11.69 (3)	na	CCoWS	Wet
CHU-CRR	0.43 (3)	na	CCoWS	Wet
CHU-CRR	26.07 (1)	na	CCWB	Dry
CH1-RWY	3.62 (3)	na	CCoWS	Wet

Esperanza Creek

Esperanza Creek is an unofficial name given to a creek and drainage adjacent to Esperanza Road. The creek is located approximately 1.7 miles north of Chualar Creek.

The head waters of Esperanza Creek are grasslands. The lower reaches of Esperanza Creek receive tail water from irrigated agriculture.

Site ESZ-HWY is a drainage ditch for irrigated agriculture and drains directly into the Salinas River. Site ESZ-OSR, like ESZ-HWY is flanked by irrigated agriculture, but is upstream of ESZ-HWY. Table 3.6 shows the nitrate-N data for Esperanza Creek.

Table 3.6 Esperanza Creek water quality data.

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source	Season
ESZ-OSR	No wet season	data available	CCoWS	Wet
ESZ-OSR	33.48 (1)	na	CCWB	Dry
ESZ-HWY	17.08 (2)	na	CCoWS	Dry

Quail Creek

Quail Creek has a confluence with the Salinas River approximately two miles downstream of the Esperanza Creek confluence.

Land use in Quail Creek is similar to Esperanza Creek. There is some grazing in the upper portions of the watershed with high-density irrigated agriculture in the lower reaches.

Both monitoring sites QUA-OSR and QUA-POT are flanked by irrigated agriculture. Table 3.7 shows the water quality data.

Table 3.7 Quail Creek water quality data.

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source	Season
QUA-OSR	0.13 (2)[1]	na	CCoWS	Wet

QUA-OSR	93.71 (1)	na	CCWB	Dry
QUA-POT	1.08 (2)[2]	na	CCoWS	Wet
QUA-POT	26.74 (1)	na	CCWB	Dry

[1]Data is from the wet season November 1999
[2]Data is from the wet season November 1999 to February 2000

Alisal Creek

The headwaters of Alisal Creek are located in the Gabilan Range, east of the City of Salinas. Headwater areas are wooded with some grasslands and pockets of residential. Alisal Creek flows from the headwaters in wooded areas through grasslands and finally through high-density irrigated agricultural lands. Alisal Creek becomes the Salinas Reclamation Canal as it flows through the City of Salinas.

Monitoring site ALI-OSR is downstream of wooded areas and grasslands and immediately downstream of irrigated agricultural fields. Monitoring site ALI-AIR is downstream of ALI-OSR and receives tail water discharges from irrigated agriculture; the watershed area between ALI-OSR and ALI-AIR is dominated by irrigated agriculture.

Table 3.8 shows water quality data from Alisal Creek.

Table 3.8 Alisal Creek water quality data.

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source
ALI-OSR	28.9 (3)[1]	na	CCoWS
ALI-AIR	6.18 (6)[1]	na	CCoWS
ALI-AIR	10.05 (2)	0.02 (1)	CCWB

[1]Data is from the wet season November 1999 to February 2000

Gabilan Creek

The Gabilan Creek drainage headwaters begin at Fremont Peak, east of the City of Salinas in the Gabilan Range. Tributaries to Gabilan Creek include Mud Creek and Towne Creek, both of which are located in the foothills of the Gabilan Range.

Monitoring site TOW-OSR, in Towne Creek, is the upper most site. Lands upstream of TOW-OSR are wooded areas with some grazing and scattered residential areas. Monitoring site GAB-OSR is in Gabilan Creek off Old Stage Road, and is downstream of TOW-OSR. Land uses upstream of GAB-OSR are similar to TOW-OSR, but also drains lands used for strawberry production. Monitoring site GAB-CRA also has wooded areas upstream of the site, but also drains lands used for vegetable production, and is located downstream of GAB-OSR. Monitoring site GAB-HER is located in Gabilan Creek downstream of GAB-CRA and has more lands draining irrigated agriculture, relative to

GAB-CRA. GAB-NAT is also in Gabilan Creek, located downstream of GAB-HER, and drains lands used for irrigated agriculture and a greenhouse complex. GAB-VET is the most downstream monitoring site of Gabilan Creek. Lands upstream of GAB-VET drain irrigated agriculture lands as well as residential.

Table 3.9 shows water quality data from the Gabilan system.

Table 3.9 Gabilan Creek water quality data.

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source	Season
TOW-OSR	0.67 (21)	na	CCoWS	Wet
GAB-OSR	0.45 (31)	na	CCoWS	Wet
GAB-OSR	0.65 (1)	na	CCWB	Dry
GAB-CRA	0.67 (40)	na	CCoWS	Wet
GAB-HER	2.36 (16)	na	CCoWS	Wet
GAB-NAT	3.82 (5)	na	CCoWS	Wet
GAB-VET	8.76 (17)	na	CCoWS	Wet
GAB-VET	20.08 (2)	0.004 (1)	CCWB	Dry

Salinas Reclamation Canal (lower)

The Salinas Reclamation Canal (lower) begins at the confluence with Alisal Creek and Gabilan Creek. The watershed area is approximately 6562 acres, with 56% of the land area in irrigated agricultural use and 35% as urbanized land use.

Monitoring site REC-VIC is approximately 1.7 miles downstream of the Alisal and Gabilan Creek confluence. Site REC-183 is approximately 5.4 miles downstream of REC-VIC. Land use between REC-VIC and REC-183 is dominated by irrigated agriculture.

Table 3.10 shows the water quality data of the Salinas Reclamation Canal (lower).

Table 3.10 Salinas Reclamation Canal water quality data.

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source	Season
REC-VIC	2.92 (31)	na	CCoWS	Wet
REC-VIC	14.88 (1)	na	CCWB	Dry
REC-183	5.84 (23)	na	CCoWS	Wet
REC-183	17.79 (1)	na	CCWB	Dry

Espinosa Slough

Espinosa Slough is located northwest of the Salinas Reclamation Canal. The Espinosa Slough has a confluence with the Reclamation Canal approximately 0.5 miles downstream of monitoring site REC-183.

Land uses in Espinosa Slough include a marshy lake area (Espinosa Lake) in the upper portions of the watershed. An un-named Creek flowing under Rogers Road delivers flow to Espinosa Lake and is the largest contributor of flow to the Lake. Land uses flanking the un-named creek are dominated by irrigated agriculture.

Monitoring site EP1-ROG is from the un-named Creek, and is located at Rogers Road. Table 3.11 shows the water quality data summary from EP1-ROG.

Table 3.11 Espinosa Slough water quality data.

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source	Season
EP1-ROG	37.55 (4)[1]	na	CCoWS	Wet

[1]Data is from wet season of year 2001-2002 (November data).

Tembladero Slough

Tembladero Slough is located northwest and downstream of Espinosa Slough Lake watershed. The most upstream site is located within the city of Castroville.

Land uses is Tembladero Slough include irrigated agriculture, accounting for 32% of the total land area, and grasslands, accounting for 24% of the total land area. The grasslands are located in the upper portions of the watershed and drain to ephemeral tributaries to Tembladero Slough. Tembladero Slough is perennial due to irrigated agriculture tail water.

Monitoring site TEM-PRE is located in Tembladero Slough within the city of Castroville. TEM-PRE is the most upsteam monitoring site. Monitoring site TEM-MOL is located downstream of TEM-PRE immediately before the confluence of Tembladero Slough and the Salinas River Estuary. Lands between TEM-PRE and TEM-MOL are dominated by irrigated agriculture.

Table 3.12 shows water quality data from Tembladero Slough.

Table 3.12 Tembladero Slough water quality data.

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source	Season
TEM-PRE	6.92 (5)[1]	na	CCoWS	Wet
TEM-PRE	29.80 (8)	0.04	CCWB	Dry
TEM-MOL	11.5 (5)[2]	na	CCoWS	Wet
TEM-MOL	24.80 (6)	0.03	CCWB	Dry

1Data from wet season from 1999-2000
[2]Data from wet season from 2002-2003

Blanco Drain

Blanco Drain is located in the lower Salinas Valley between the Salinas River and the Salinas Reclamation Canal. Blanco Drain is a perennial drain carrying tail water from irrigated agriculture that is discharged to the Salinas River. Water from the Blanco Drain makes its way to the Salinas River by being pumped from the drain to the Salinas River. The Blanco Drain subwatershed is 93% irrigated agriculture.

Monitoring site BLA-COO is a Blanco Drain site located along Cooper Road. This site is located approximately 1.5 miles from the Salinas River. Monitoring site BLA-PUM is a site at the pump where water from Blanco Drain is pumped to the Salinas River. BLA-PUM is located approximately 1.3 miles from the Salinas River.

Table 3.13 shows water quality data from the Blanco Drain monitoring sites.

Table 3.13 Blanco Drain water quality data.

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source	Season
BLA-COO[1]	49.3 (3)	na	CCoWS	Wet
BLA-COO	73.09 (6)	0.005 (6)	CCWB	Dry
BLA-PUM	53.35 (2)[2]	na	CCoWS	Wet

[1]Data from wet season from November 2002.
[2]Data from wet season of November 2002 and 2003.

Nitrate-N concentration in Blanco Drain is the highest observed in the watershed.

Salinas River (Lower)

Salinas River (Lower) is the Salinas River beginning at the city of Gonzales downstream to about 1.6 miles upstream of Del Monte Road.

Land use within the Salinas River (Lower) is approximately 58% irrigated agriculture and 27% grassland; land use immediately adjacent to the Salinas River is predominantly irrigated agriculture.

There are several monitoring sites on the Salinas River. Monitoring site SAL-GON is located on Gonzales River road near the city of Gonzales. SAL-CHU is located on Chualar River Road near the city of Chualar. Site SAL-SPR is located at Spreckels Road. Monitoring site SAL-DAV is located at the Davis Road crossing. Finally, site SAL-BLA is located at the Salinas River crossing of Blanco Road, which is upstream of the confluence of Blanco Drain and the Salinas River.

Table 3.14 shows the water quality data for the monitoring sites along the Salinas River.

Table 3.14 Salinas River (Lower) water quality data.

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source	Season
SAL-GON	0.45 (17)	na	CCoWS	Wet
SAL-GON	0.29 (14)	0.01 (3)	CCWB	Dry
SAL-CHU	0.68 (23)	na	CCoWS	Wet
SAL-CHU	0.19 (5)	0.02 (3)	CCWB	Dry
SAL-SPR	0.59 (8)	na	CCoWS	Wet
SAL-SPR	na	na	CCWB	Dry
SAL-DAV	0.93 (16)	na	CCoWS	Wet
SAL-DAV	8.92 (7)	0.002 (5)	CCWB	Dry
SAL-BLA	1.28 (5)	na	CCoWS	Wet
SAL-BLA	2.99 (6)	0.0025(6)	CCWB	Dry

Salinas River Lagoon

The Salinas River Lagoon (North) is the continuation of the Salinas River. The Salinas River Lagoon [(North), referred to as the Lagoon] flows from upstream of Del Monte Road westward to the Salinas River National Wildlife Refuge along the Pacific Ocean, where the River turns northward and the name changes to the Old Salinas River Estuary. A sand bar at the Lagoon/Ocean interface is sometimes breached during the rain season to help prevent flooding.

Land use area contributing to the Lagoon is 71% irrigated agriculture. Monitoring site SAL-MON is located at the intersection of Del Monte Road and the Salinas River. Table 3.15 shows the concentration data from site SAL-MON.

Table 3.15 Salinas River Lagoon water quality data.

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source
SAL-MON	1.35 (16)	na	CCoWS
SAL-MON	35.25 (8)	0.018 (7)	CCWB

Old Salinas River Estuary

The Old Salinas River Estuary (Estuary) is the last 3.9 miles of channel before the Salinas River drains into the Moss Landing Harbor. The Estuary is tidally influenced, and tide-gates mark the Estuary/Moss Landing Harbor interface. The Salinas River Lagoon, as well as Tembladero Slough, contributes freshwater flows to the Estuary. The Estuary is a perennial water body.

Land use of the Estuary subwatershed is 82% irrigated agriculture. Two monitoring sites are used to gage nitrate-N and ammonia concentration in the Estuary. OLS-MON is located at the Monterey County Dunes, and OLS-POT is located at the extreme downstream end of the Lagoon at Potrero Road, where the tide gates are located.

Table 3.16 shows the nitrate-N and unionized ammonia data from the monitoring sites.

Table 3.16 Old Salinas River Estuary water quality data.

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source
OLS-MON	8.24 (4)[1]	na	CCoWS
OLS-MON	23.60 (7)	0.018 (7)	CCWB
OLS-POT	0.4 (3)[1]	na	CCoWS
OLS-POT	18.0 (7)	0.01 (7)	CCWB

[1]Data from wet season from November 2002.

3.5. Stormwater

The majority of stormwater from the City of Salinas flows through a pump station located on Hitchcock Road on the western edge of Salinas. The City of Salinas operates the pump station at the wastewater facility. The storm water is pumped through a subterranean pipe approximately 1.2 miles in length before being discharged to the Salinas River upstream of Davis Road.

Monitoring site SDR-PUM is located at the pump station. Table 3.17 shows the summary data from SDR-PUM.

Table 3.17 Storm Water Data

Site	Median Nitrate-N mg/L-N (# of data)	Median NH_3-N mg/L (# of data)	Data Source
SDR-PUM	1.17 (3)	0.003 (3)	CCWB

4. Source Analysis

Source categories: background, point sources, storm water, irrigated agriculture, other non-point sources.

4.1. Background

Background, or natural sources of nitrate-N and unionized ammonia are estimated using water quality data gathered from the Arroyo Seco subwatershed. Monitoring sites along the Arroyo Seco (see Section 3.3, Arroyo Seco) receive flows from lands that are nearly undisturbed, relative to other subwatersheds within the project area. The Arroyo Seco Creek has less flow and is higher in the watershed, relative to the Salinas River, and may therefore have slightly different background levels of nitrate-N and unionized ammonia concentrations. However, since the lower Salinas River does not contain any undisturbed areas with which to determine background levels of nitrate-N and unionize ammonia, staff consider the Arroyo Seco a usable reference.

Background concentration of nitrate-N and unionized ammonia is 0.05 mg/L-N and 0.001 mg/L-N, respectively, based on data from the Arroyo Seco.

4.2. Point Sources

Data for regulated point dischargers is summarized in Section 3.3. Note that all of the five currently held NPDES permits discharge to the Salinas Reclamation Canal, which in turn discharges to the Old Salinas River Estuary. Therefore, the Salinas River is not affected by these discharges.

Of the five facilities investigated, staff concludes that the discharge from the Uni-Kool Company is likely to have a measurable affect on nitrate-N, and potentially unionized ammonia, concentration in the Salinas Reclamation Canal and the Old Salinas River Estuary. The magnitude of affect in receiving waters is not known due to the lack of flow data. However, note that the concentration of nitrate-N discharged from Uni-Kool is less than the proposed numeric target. Since unionized ammonia is not monitored, the level of affect is unknown. However, since 2004 TKN data ranged from 1.8-2.5 mg/L-N, it is possible that some of the TKN present is in the form of unionized ammonia.

Other point discharges are not considered significant sources of nitrate and/or unionized ammonia due to the low-threat nature of the discharge and/or the volume of discharge.

4.3. Storm Water

Storm water from the following entities is currently, or expected to be, regulated with by an NPDES permit for storm water discharge:

1. City of Salinas
2. Monterey County, including several developed areas not within an incorporated city, e.g.,
    a. Castroville
    b. Los Pomes housing development
    c. Pines Canyon housing development
    d. Arroyo Seco housing development
    e. Toro Creek housing development.

City of Salinas Storm Water

Storm water from the City of Salinas is discharged to the Salinas River. The majority of the storm water discharge (about 90%) is discharged to the Salinas River through a discharge pipe located just upstream of the Davis Road-Salinas River crossing. The storm water is pumped from a pump station at monitoring site SDR-PUM (see Section 3.5, Table 3.15). The median nitrate-N concentration at the pump is 1.17 mg/L-N. The median unionized ammonia concentration at the pump is 0.003 mg/L-N. Both the nitrate-N as well as the unionized ammonia concentration of the storm water are less than the proposed TMDL numeric targets.

Monterey Regional Group

Several entities representing developed areas that manage storm water have combined efforts to comply with NPDES regulations regulating storm water. The Monterey Regional Group includes the cities of Monterey, Del Rey Oaks, Sand City, Seaside, Pacific Grove, Marina, and the County of Monterey, all within Monterey County, as well the town of Castroville and several housing developments within the county. A storm water permit to the Monterey Regional Group is pending. No data specific to these cities and/or developments is available.

A quantification of the nitrate-N and unionized ammonia contribution from these areas cannot be made at the time of this document preparation. However, Water Board staff believe that nitrate and unionized ammonia contributions (on a concentration basis) from these areas, once established, will be comparable to contributions made by the city of Salinas. This belief is predicated on data from the storm water gathered from the City of Salinas stormwater pump site (SDR-PUM) discussed in the subsection above.

Gonzales and Chualar Storm Water

The towns of Gonzales and Chualar discharge storm water to ditches that also receive discharges from irrigated agriculture. The discharge eventually reaches the Salinas River (River). Discharge from Gonzales is first held in detention ponds located near the River before being discharged through a pump system. No data is available from either the town of Chualar or Gonzales. In addition, data from the discharge would not be purely storm water, but a mixture with agriculture tail water.

Water Board staff believes that nitrate and unionized ammonia contributions (on a concentration basis) from these areas, is comparable to contributions made by the city of Salinas.

Summary of Storm Water Nitrate-N and Unionized Ammonia Contribution

Staff consider the stormwater contribution of nitrate-N and unionized ammonia to be consistent with data from CCWB monitoring site SDR-PUM. As such, the nitrate-N and unionized ammonia contribution to receiving waters from stormwater is 1.17 mg/L-N and 0.003 mg/L-N, respectively.

4.4. Irrigated Agriculture

Nitrate-N and unionized ammonia contributions to surface waters in the lower Salinas valley varies with respect to location and season. Tables 3.4, 3.5, and 3.6 show summary data for Chualar, Esperanza, and Quail Creeks, respectively. Monitoring sites CHU-CRR, ESZ-OSR, and QUA-POT are flanked by irrigated agriculture landuse. Note that median nitrate-N concentrations at these monitoring sites range from less than 1 to over 90 mg/L-N. In addition, there is a clear tendency of dry season concentrations being highest, relative to wet weather data.

Figure 4.1 illustrates nitrate-N concentration at monitoring sites along Chualar Creek from June to September 2001. Seven matched data for each monitoring site were extracted from the Chualar Creek dataset for the illustration below. Note that site CHU-CCR is dry during this time period whereas downstream sites CHU-CRR and CH1-RWY are flowing and have nitrate-N concentrations of about 30 mg/L-N. These latter two sites are flanked and downstream of irrigated agriculture landuse, which supply flow to these sites. The patchwork of rectangles surrounding the sites shown in the figure are agriculture fields.

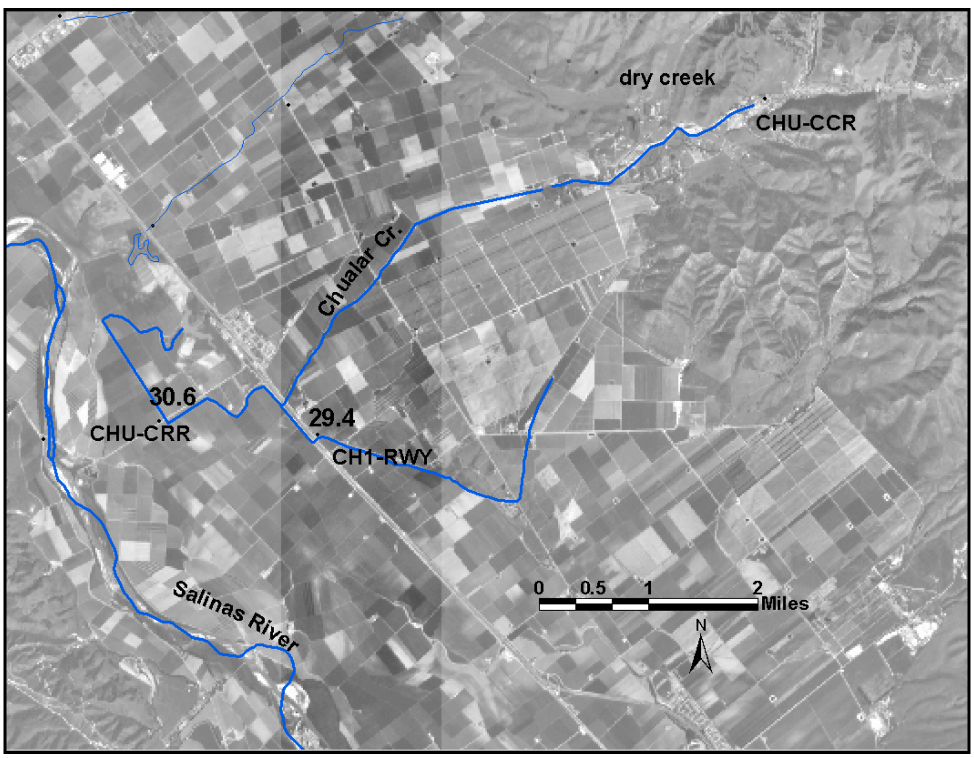

Figure 4.1 2001 dry season median nitrate-N along Chualar Creek.

Figure 4.2 shows the effect of irrigated agricultural landuse on nitrate-N concentration in Gabilan Creek. Note that site GAB-OSR is downstream of grasslands and forested areas, having a median nitrate-N concentration of 0.65 mg/L-N. Site GAB-VET is downstream of irrigated agriculture landuse and has a median nitrate-N concentration of 20.08 mg/L-N. Site GAB-VET is within the city limits of Salinas, and could therefore receive nitrogen forms from urban stormwater. However, Figure 4.2 illustrate dry-weather nitrate concentrations, when stormwater flow is absent or nearly nil.

Also note in Figure 4.2 that Gabilan Creek flows into the Salinas Reclamation Canal, where nitrate-N concentration rises from 10.05 mg/L-N upstream of the confluence with Gabilan to 14.88 mg/L-N downstream of the confluence. The higher nitrate-N concentration of Gabilan Creek during the dry season results in elevated nitrate-N concentration in Salinas Reclamation Canal.

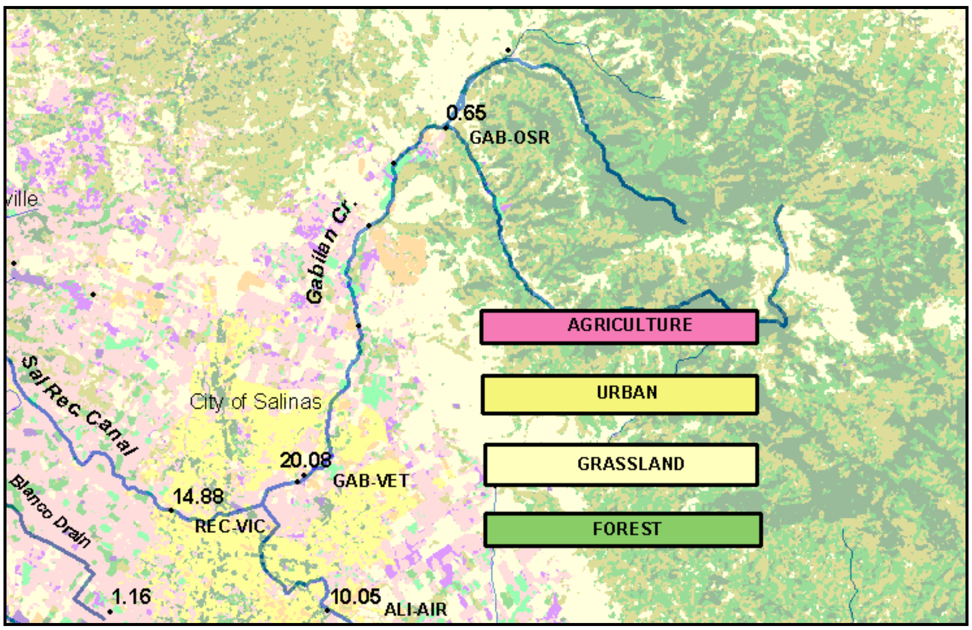

Figure 4.2 Dry season median nitrate-N concentration in Gabilan Creek.

Flow in Blanco Drain is almost exclusively from irrigated agriculture tail water. The median nitrate-N value in Blanco Drain is 73 mg/L during the dry season and 49 mg/L-N during the wet season. In addition, monitoring site SDR-PUM (Table 3.15) is storm water from the city of Salinas before passing through the mile-long underground pipe located entirely under lands used for irrigated agriculture (see Section 3.5). Table 3.15 shows that the median storm water nitrate-N concentration is 1.17 mg/L-N before passing under the irrigated agriculture fields. The median nitrate-N concentration at the discharge end of the pipe (monitoring site 309SDR) after passing under the field is 55.5 mg/L-N. In addition to the increased concentration at the discharge end, the flow at the discharge end is greater than that at the pump end. Staff concludes that the increased concentration and flow at the discharge end of the storm drain pipe is from soil water infiltration into the pipe. The higher concentration at the discharge end, relative to the upstream end, which is purely stormwater, is evidence of the higher nitrate-N concentration of agricultural water, relative to stormwater.

Figure 4.3 illustrates the dry season median nitrate-N concentration in Blanco drain, as well as the resulting nitrate-N concentration of the receiving water body, the Salinas River. The patchwork of rectangles surrounding the sites shown in the figure are agriculture fields

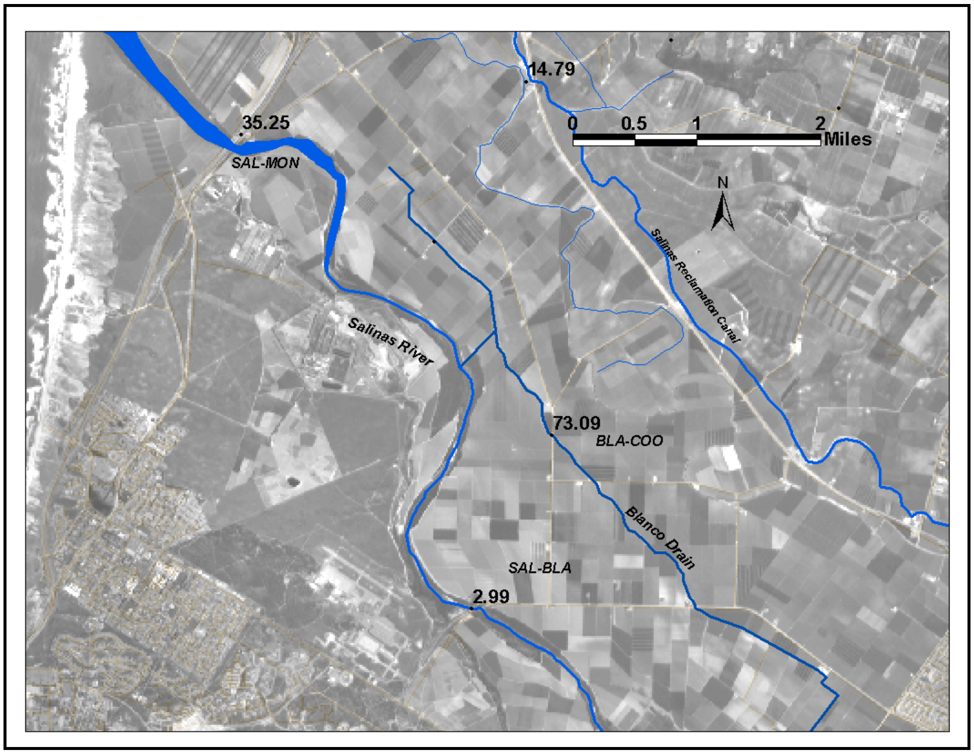

Figure 4.3 Dry season nitrate-N concentration in Blanco Drain and Salinas River.

Note in Figure 4.3 that nitrate-N concentration in the Salinas River rises from 2.99 mg/L-N at monitoring site SAL-BLA, along Blanco Road, to 35.25 mg/L-N at monitoring site SAL-MON, which is downstream of the confluence with Blanco Drain. SAL-MON also receives flows from adjacent agricultural use. Note that median dry weather nitrate-N concentration in Blanco Drain at site BLA-COO is 73.09 mg/L-N.

Unionized ammonia data is summarized in Table 4.1. Maximum values are illustrated in Figure 4.4. The number of exceeds in the table denote the number of samples the water quality objective for unionized ammonia was exceeded during the sampling period (April to November 2004). Recall that the unionized ammonia water quality objective is 0.025 mg/L-N.

Table 4.1 Unionized ammonia concentrations in lower Salinas Valley during 2004 CCWB sampling.

SITE	MIN[1] mg/L-N	MAX[2] mg/L-N	MEDIAN[3] mg/L-N	N[4]	EXCEEDS[5]
SAL-MON	0.003	0.31	0.018	7	2
TEM-MOL	0.01	0.099	0.03	5	3
OLS-POT	0.004	0.046	0.01	7	2
TEM-PRE	0.02	0.042	0.04	7	6
OLS-MON	0.003	0.04	0.016	6	2
SAL-BLA	0.001	0.037	0.003	6	1
SAL-DAV	0.002	0.026	0.002	5	1
SAL-CHU	0.007	0.023	0.016	4	0
ALI-AIR	0.02	0.02	0.02	1	0
SAL-GON	0.01	0.01	0.01	3	0
SAL-GON	0.01	0.01	0.01	3	0
SDR-PUM	0.002	0.01	0.003	3	0
BLA-COO	0.003	0.008	0.005	6	0
GAB-VET	0.004	0.004	0.004	1	0
309-SDR	0.002	0.002	0.002	3	0

[1] MIN: minimum value observed.
[2]MAX: maximum value observed.
[3]MEDIAN: median value observed.
[4]N: number of data.
[5]EXCEEDS: number of exceedence of the unionized ammonia water quality objective (0.025 mg/L-N).

Figure 4.4 shows the maximum unionized ammonia concentrations observed during the sampling period from April 2004 to November 2004. Maximum values are used because the numeric target is stated as a maximum value. The highest unionized ammonia concentration observed is at SAL-MON (0.31 mg/L-N) in late August 2004. SAL-MON is one of the most downstream sites of the Salinas River; OLS-MON is downstream of SAL-MON but is more tidally influenced and therefore subject to diluting ocean water. The high unionized ammonia concentration in August may be indicative of the Salinas River being dominated by flow from agricultural discharge during this time of year.

The next highest maximum value of unionized ammonia is at the site TEM-MOL, having a concentration of 0.099 mg/L-N. TEM-MOL is the most downstream monitoring site of the Tembladero Slough, and is downstream of some of the most intensively farmed lands in the state. Also note from Table 4.1 that the two Tembladero Slough sites (TEM-MOL and TEM-PRE) carry the highest median concentration of unionized ammonia. Tembladero Slough also receives flow from the Salinas Reclamation Canal, which receives flow from several sources, including point source discharges, stormwater discharges, and flow from Gabilan Creek. Note, however, that the unionized ammonia concentration at ALI-AIR, which is an upstream Salinas Reclamation Canal site, and GAB-VET, a Gabilan Creek site, are lower than the TEM-MOL concentration. In addition, site SDR-PUM is exclusively stormwater, and has a maximum concentration of 0.01 mg/L-N. Staff conclude that the most probable cause of elevated unionized ammonia concentrations at TEM-PRE and TEM-MOL is agricultural activities in the lower Salinas watershed. Future monitoring of point sources discharging to the Salinas Reclamation Canal will be used to further clarify relative contributions.

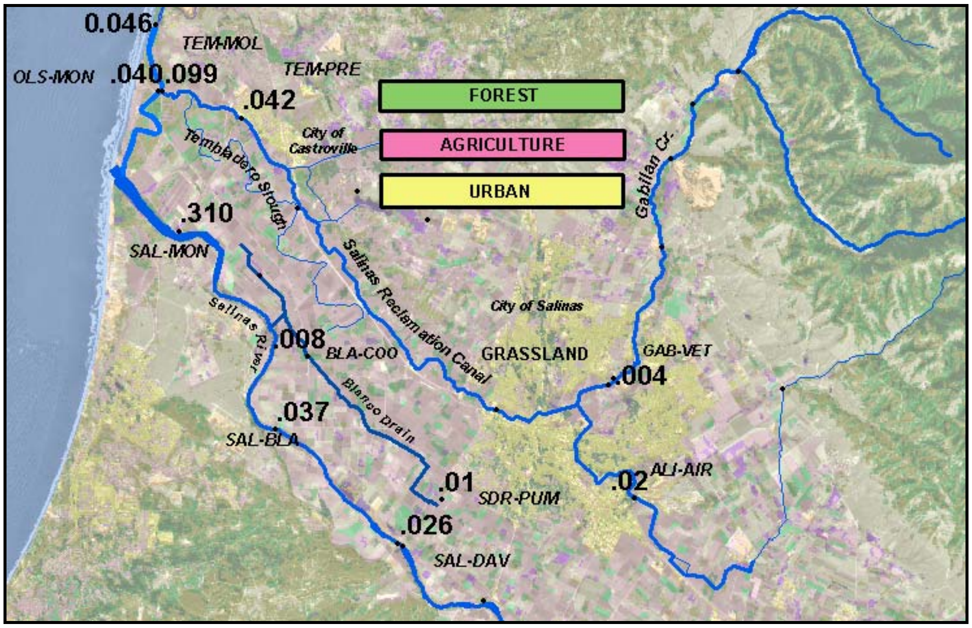

Figure 4.4 Maximum unionized ammonia concentrations in lower Salinas Valley during 2004 CCWB sampling.

Summary of Irrigated Agriculture Nitrate-N and Unionized Ammonia Contribution

Staff concludes, from the information presented above, that the source of the largest proportion of nitrate and unionized ammonia present in surface waters in the lower Salinas Watershed is fertilizer used on agricultural lands. Ammonium nitrate fertilizer, as well as similar forms, are used extensively in the lower Salinas watershed, resulting in elevated nitrate-N and unionized ammonia.

Greenhouses

There are no monitoring sites that exclusively monitor discharges from greenhouses. However, monitoring site QUA-OSR is downstream of a greenhouse complex and has irrigation pipes discharging to the Quail Creek. Data from this monitoring site can be seen in Table 3.7. Greenhouses are also located upstream of monitoring site EP1-ROG. This data can be seen in Table 3.10. Although neither of these monitoring sites exclusively monitors discharges from greenhouses, nitrate concentrations downstream of these two facilities exceed the numeric target proposed for this TMDL. It is probable that discharges from greenhouses contain nitrate-N and potentially unionized ammonia concentrations greater than the proposed numeric targets. However, the contribution of nitrate-N and unionized ammonia to the listed waterbodies cannot be quantified at the time of this document preparation. Discharges from greenhouse facilities are subject to regulation under the Conditional Waiver. The greenhouse source is therefore considered an irrigated agriculture source.

4.5. Non-Agricultural Land Discharge Sources

Discussion of non-point sources in Section 3.3 summarizes data from several dischargers discharging to land in the lower Salinas valley. The following section discusses each of these sources as a potential loading source to surface waters.

The Bluffs facility discharges to seepage pits. The Bluffs discharge point is on a hill approximately 100 feet above the Salinas River. The soil on the hill is clay, and the depth to ground water is 60-100 feet. Monitoring of nitrogen compounds is not required of the discharger and no other data source of nitrogen from this facility is available. The impact of this discharge to Salinas nitrate-N and unionized ammonia concentration is not quantifiable. However, it is unlikely that this discharge has a measurable impact on the Salinas River nitrate-N and unionized ammonia, due to the distance of the discharge to the Salinas River and the depth to groundwater.

California Utilities STP discharges an average 300,000 gallons per day over a field immediately adjacent to the Salinas River. Depth to ground water is from 2-15 feet. Groundwater data from the facility indicates a net dilution affect on groundwater nitrate-N concentration. Groundwater nitrate-N concentration at the downgradient most well did not exceed 0.48 mg/L-N in 2003-2004, indicating this source does not cause exceedence of the nitrate-N numeric target in adjacent surface waters. Analysis of groundwater TKN is inconclusive. However, the TKN concentration in the downgradient well does not exceed 2.6 mg/L-N, so is within the proposed nitrate-N numeric target. Groundwater unionized ammonia is not monitored. However, note that the maximum unionized ammonia concentration at SAL-DAV (Figure 4.4) is 0.026 mg/L-N, which is 0.01 mg/L-N above the numeric target. Staff conclude that although a potential exists for nitrate-N and unionized ammonia loading from this facility to the Salinas River, the loading, if any, is not causing an increase in nitrate-N concentration above the numeric target. Unionized ammonia data is insufficient for staff to make a determination regarding this facilities contribution.

The Chualar WWTP infiltration ponds are located about 700 feet from the Salinas River. The depth to ground water is 10-25 feet. Effluent nitrate-N concentration ranges from 0-0.2 mg/L-N and TKN ranges from 23.6 to 50.4 mg/L-N. Nitrate-N groundwater data has not been inconsistently collected. Available data is insufficient to determine whether the infiltrated effluent is having a measurable affect on groundwater, and potentially the Salinas River. Groundwater unionized ammonia is not monitored. Therefore, the affect of the discharge on nitrate-N and/or unionized ammonia loading to the Salinas River through groundwater is unknown. Future monitoring will be needed to determine the impact of this source on nitrate-N and unionized ammonia concentration in the Salinas River.

The Gallo Cattle Company discharge is located far enough from a surface water to be considered an unlikely measurable source of nitrate-N or unionized ammonia to listed surface waters or their tributaries.

The Gonzales WWTP discharges about 0.55 million gallons per day to percolation ponds near the Salinas River. Shallow well data indicates that the discharge has a net dilution affect on ground water down gradient of the discharge. No exceedences of the nitrate-N numeric target occurred in downgradient monitoring wells. Staff concludes that discharge from this facility is not causing an exceedence of the proposed nitrate-N numeric target in the adjacent Salinas River. Groundwater unionized ammonia data is not available. It is likely that unionized ammonia concentration decreases along with nitrate-N concentration as a result of the discharge. This supposition will be verified with future monitoring.

The Las Palmas discharge is a land discharge located near the Salinas River. Groundwater data was considered in the analysis of this facilities contribution to nitrate-N and unionized ammonia to the Salinas River. The groundwater data indicate that another nitrogen source, other than the discharge, is present in the monitoring wells. Therefore, a conclusion cannot be drawn regarding the facilities contribution to nitrate-N and unionized ammonia in the adjacent Salinas River.

Monterey Dunes Colony WWTP discharge is a land discharge a quarter mile away from the Salinas River, and is not adjacent to a tributary. The leach fields are located on rolling sand dunes. Depth to groundwater is about ten feet. Groundwater is intruded by seawater at the location. Although no monitoring is required, it is unlikely that any nitrate-N or unionized ammonia in the discharge would have a measurable affect on the Salinas River, due to the distance of the discharge to the Salinas River and the fact that seawater is intruding the infiltration zone.

Discharge from the MRWPCA that is not discharged to the ocean is reused for the Castroville Seawater Intrusion Project. Nitrate-N and unionized ammonia loading from this source is accounted for in the irrigated agriculture source category. The loading is not quantifiable because effluent nitrogen is not monitored. However, if the secondary treated effluent data (Table 3.2) indicates available nitrogen concentration, this is a probable source of nitrogen to the Tembladero Slough, which drains to the Old Salinas River Estuary.

The Salinas Industrial WTP discharges about two million gallons per day to land adjacent to the Salinas River near Davis Road. Total nitrogen of the effluent ranges from 5-20 mg/L-N. Most of the nitrogen in the discharge is organic, evidenced by the type of discharge and the relative high TKN concentration. It is possible that some of the organic nitrogen in the effluent is in the form of unionized ammonia and some of the nitrogen is being converted to nitrate-N after being discharged, which would account for the increase in nitrate-N concentration in the downgradient well (see Table 3.3). However, the contribution to groundwater nitrate-N from the facility cannot be verified because the data also indicates that nitrate-N concentration in the downgradient well is higher than the total nitrogen in the upgradient well. This phenomenon indicates that another source of nitrogen may be present. The other source may be nitrate-N from soil water originating from surrounding agriculture. Finally, note from Table 3.3 that groundwater nitrate-N concentration does not exceed the numeric target, even with the potential additional nitrogen source. Unionized ammonia is not sampled. Staff conclude that the information available is insufficient to determine whether this facility is a source of nitrate-N and/or unionized ammonia to the Salinas River, and that discharge from the facility is not causing exceedence of the nitrate-N numeric target. The unionized ammonia contribution cannot be verified or quantified.

San Jerardo WWTP discharges to land approximately 2.5 miles east of the Salinas River. No well monitoring data is available to gauge the impact to surrounding surface waters. However, the San Jerardo facility is located 2.5 miles from the Salinas River, and therefore is unlikely to have a measurable affect on nitrate-N and unionized ammonia levels in the Salinas River. A tributary to Alisal Creek is adjacent to the facility. However, Alisal Creek, as well as its tributaries, are ephemeral streams. These facts, along with the nature and volume of discharge lead staff to conclude that it is unlikely that the San Jerardo facility has a measurable affect on nitrate-N and unionized ammonia concentrations in the listed waterbodies.

Summary of Non-agricultural Land Discharges

Of the entities discussed, several may be contributing nitrate-N, or other forms of nitrogen that could later be converted to nitrate-N, to the listed surface waters through groundwater flow. Nitrate-N loading from these sources cannot be verified or quantified with available information. However, available data suggests that none of the non-agricultural land discharges are causing exceedence of the proposed nitrate-N numeric target in adjacent surface waters. In fact, available data suggests that groundwater contributions resulting from land discharges are having an overall dilution affect on groundwater nitrate-N concentration. Monitoring of unionized ammonia is not required of the facilities reviewed. Consequently, no conclusion can be drawn regarding the non-agriculture land discharges' contribution of unionized ammonia to surface waters.

4.6. Relative Source Contributions

A weight of evidence approach is used to estimate relative contributions of nitrate-N and unionized ammonia to the listed water bodies. This approach must be used since data is unavailable or insufficient from some regulated facilities to draw firm conclusions. The list of sources is used to help determine which sources should receive the greatest attention with the objective of meeting the numeric targets, and thereby restoring protection of beneficial uses in the listed water bodies.

The relative contributions of nitrate-N and unionized ammonia, in order of decreasing contribution area:

1. Irrigated agriculture (including Greenhouses)
2. Regulated Point Sources
3. Non-Agriculture Land Discharges
4. Storm Water

5. Background

Ground water data indicate that nitrate-N concentration in shallow aquifers far exceeds the proposed numeric target; nitrate-N concentrations reach higher than 50 mg/L-N in areas influenced by non-point sources. Recall that a clay layer 10-20 feet from the surface acts to perch shallow groundwater. The continuous nitrate-N loading from nonpoint sources to shallow groundwater has resulted in elevated groundwater nitrate-N concentrations above expected background levels. However, since the essential source of shallow groundwater nitrate-N is surface nonpoint sources, *visa vis* irrigated agriculture and non-agriculture land discharges, the ground water source is accounted for in these source categories.

5. CRITICAL CONDITIONS AND SEASONAL VARIATION

Nitrate-N and unionized ammonia concentrations in the Salinas Watershed vary seasonally; concentrations are greatest during the low-flow season. The low flow season is also a critical condition since nitrate-N and unionized ammonia concentrations are at a maximum at this time of the year.

The TMDL accounts for critical conditions and seasonal variation insofar as the TMDL and allocations are expressed in terms of concentration. The TMDL (a concentration) cannot be exceeded during any season, including during the time of year when concentrations are greatest (the critical condition).

6. NUMERIC TARGET

The numeric target for nitrate-N is a concentration of 10 mg/L-N, expressed as a monthly median. The numeric target for unionized ammonia is 0.025 mg/L-N, expressed as a maximum.

The nitrate-N numeric target protects the MUN beneficial use as well as potential toxicity to aquatic organisms. The unionized ammonia numeric target protects aquatic organisms from the toxic affects of unionized ammonia.

7. LINKAGE ANALYSIS

The objective of the linkage analysis is to demonstrate a cause and effect relationship between loading and the water quality indicators, i.e., resulting nitrate-N and unionized ammonia concentration.

The TMDL demonstrates a linkage between the source loads and the resulting water quality parameters of nitrate-N and unionized ammonia concentration by setting the TMDL equal to the water quality objectives for nitrate-N and unionized ammonia. Thus, the loading to the surface waters will be directly indicated and measured by concentrations of nitrate-N and unionized ammonia in receiving waters.

8. TMDL CALCULATION AND ALLOCATIONS

8.1. TMDL

No calculations are needed to determine the nitrate-N and unionized ammonia TMDLs since these TMDLs are equal to pre-established water quality objectives, which are expressed in units of concentration, and not load.

8.2. Allocations

The allocations of nitrate-N and unionized ammonia are in units of concentration and are consistent with existing Basin Plan objectives (objective) for these constituents. Any discharge exceeding either the nitrate-N and/or unionized ammonia objective will have an allocation less than is currently being discharged. Conversely, any discharge discharging nitrate-N and/or unionized ammonia less than the current water quality objectives for these constituents will have an allocation equal to its current loading; this is consistent with State Water Resources Control Board adopted resolution 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," otherwise referred to the anti-degradation policy.

Wasteload Allocations

Wasteload allocations are allocated to the following entities:

- Cool Pacific Land Co.
- UNI-KOOL Salinas Facility (Market Street)
- UNI-KOOL Salinas Facility (Abbot Street)
- P&O Logistics
- Growers Ice Company

Allocation:
The monthly median nitrate-N concentration of effluent shall not exceed 10 mg/L-N.
The monthly maximum unionized ammonia concentration of effluent shall not be greater than 0.25 mg/L-N

Anti-degradation:
If historic (previous year) nitrate-N effluent concentration is less than the allocation, monthly median effluent nitrate-N concentration shall not be greater than historic concentration.

If historic (previous year) unionized ammonia effluent concentration is less than the allocation, monthly maximum effluent unionized concentration shall not be greater than historic concentration.

Load Allocations

Load allocations are allocated to the following entities:

- Irrigated agriculture
- All discharges to land, including but not limited to discharges to ponds, spray irrigation, drip irrigation, flood irrigation, and leach fields. Not sure about these…I cannot prove that they are even discharging to surface waters.

Allocation:
Discharges shall not cause monthly median nitrate-N concentration in surface waters to exceed 10 mg/L-N.

Discharges shall not cause monthly maximum unionized ammonia concentration in receiving water to be greater than 0.25 mg/L-N.

Antidegradation:
If historic (previous year) nitrate-N is less than the allocation, monthly mean nitrate-N concentration shall not be greater than historic concentration.

If historic (previous year) unionized ammonia is less than the allocation, monthly maximum unionized concentration shall not be greater than historic concentration.

8.3. Margin of Safety

An implicit margin of safety is used to account for uncertainties inherent in TMDL development. The implicit margin of safety is accounted for in the use of numeric targets developed from existing water quality standards for nitrate-N and unionized ammonia.

The nitrate-N and unionized ammonia standards used as the basis of numeric targets are promulgated by USEPA. These standards have been scientifically reviewed and established with calculated acceptable risk.

9. PUBLIC PARTICIPATION

Stakeholder outreach activities are occurring on three fronts: 1) agricultural community 2) agencies, and 3) regulated dischargers. The environmental community is brought into the process through outreach activities associated with one or more of the three fronts. The three fronts are discussed below.

9.1. Agricultural Community

The agricultural community is informed and made part of the process through the Farm Water Quality Short Courses (Short Courses). The short courses are a requirement of the Conditional Waiver for Agricultural Discharges (Conditional Waiver). Growers attending the Short Courses are informed of 303(d) listed water bodies and the constituents that the water body is listed for. Central Coast Water Board Staff (Staff) assigned to work related to the Conditional Waiver have summarized the content of the Short Course, which is contained at Attachment-1 of this report. Watershed assessment unit staff (Chris Rose) attended the Short Course in November 2004, which was held in the City of Salinas. Short Course locations and dates are provided in Attachment-1.

9.2. Agencies

Many representatives of agencies associated with the agricultural community attend the Short Courses. In addition, staff have made outreach efforts in coordination with the Department of Health Services and their involvement with the Salinas River Fecal Coliform TMDL. Staff attended and presented current TMDL efforts to representatives of several agencies in a May 2005 meeting held in the City Salinas. A rooster of the participants is provided in Attachment-2. Follow up meetings are tentatively scheduled for the summer of 2005.

9.3. Regulated Dischargers

The Central Coast Water Board regulates discharges from point and non-point sources. Staff have compiled point and land discharges currently regulated. In some cases, modifications to current Monitoring and Reporting Programs (M&RP) associated with NPDES permits and WDRs will be required as part of the implementation plan of the TMDL. Regulated dischargers will be notified when modifications to M&RPs are being considered. Regulated dischargers who's NPDES permit or WDR is being renewed before approval of the TMDL by the Regional Board will be notified upon the renewal of the permit or WDR if it is likely that the discharger will be identified as a responsible party in the implementation plan of the TMDL.

9.4. Other Stakeholders

The Salinas River Nutrient TMDL will be implemented through a basin plan amendment. As such, a 45-day public review and comment period is required under CEQA guidelines. Potential stakeholders who are not brought into the review process before the 45 day comment period will be given an opportunity to comment during the review period.

10. IMPLEMENTATION AND MONITORING PLAN

10.1. Point Discharges

- Central Coast Water Board staff will amend existing NPDES permits to incorporate nitrate-N and unionized ammonia effluent limits in permits. The effluent limits will be consistent with the allocations of the TMDL.
- The Executive Officer (EO) or the Central Coast Water Board will amend the Monitoring and Reporting Program (M&RP) of existing NPDES permits to incorporate effluent and stream monitoring for nitrate-N and unionized ammonia, and to incorporate reporting of these monitoring activities. Amendment of the M&RP will occur within one year of approval of the TMDL by the Office of Administrative Law (OAL). The M&RP of the following entities will be affected:
    - MUST BE DETERMINED

10.2. Nonpoint Discharges

Irrigated Agriculture

Landowners and operators of irrigated lands in the watershed will implement actions needed to achieve the allocations to irrigated agriculture pursuant to the Conditional Waiver of Waste Discharge Requirements for Discharges to Irrigated Lands (Conditional Waiver).

Implementation and monitoring requirements for parties engaged in agricultural activities are consistent with, and rely upon, the Conditional Waiver. Monitoring reports and data associated with the Conditional Waiver, as well as other information, will be used to determine whether management measures being taken are sufficient to achieve the TMDL by the year 2012. Central Coast Water Board staff will make this determination every three years as described in the Tracking and Monitoring section below. If implementation actions are insufficient to achieve the TMDL, additional implementation actions will be required through approval by the Executive Officer (e.g. pursuant to CWC section 13267 or section 13383) or by the Central Coast Water Board; approval of additional actions by the Executive Officer or the Central Coast Water Board will occur as soon as practicable.

MUST REVIEW MONITORING REQUIREMENTS OF CONDITIONAL WAIVER AND AMBIENT MONITORING TO SEE IF LISTED WATERBODIES ADEQUATLY BEING MONITORED.

10.3. Non-Agriculture Non-Point Sources

- The Executive Officer (EO) or the Central Coast Water Board will amend the Monitoring and Reporting Program (M&RP) of existing WDRs and Recycled Water User Requirements to incorporate effluent and receiving water (groundwater) monitoring for nitrate-N and unionized ammonia, and to incorporate reporting of these monitoring activities. Amendment of the M&RP will occur within one year of approval of the TMDL by the Office of Administrative Law (OAL). The M&RP of the following entities will be affected:
  - MUST BE DETERMINED; there are several facilities that are not monitoring groundwater, or if they are, are not monitoring nitrate and/or unionized ammonia. Some of these facilities are land-dischargers that are close enough to the Salinas River or a tributary to warrant monitoring. In a few cases, the monitoring wells are supposed to be upgradient and downgradient of the discharge. However, there is some doubt (on my part) as to whether they are truly upgradient.

10.4. Assessment and Review

Regional Board staff will conduct a review every three years beginning three years after TMDL approval by the Office of Administrative Law. Regional Board staff will utilize Annual Reports, as well as other available information, to review water quality data and implementation efforts of responsible parties and progress being made towards achieving the allocations and the numeric target. Regional Board staff may conclude and articulate that ongoing implementation efforts may be insufficient to ultimately achieve the allocations and numeric target. If staff makes this determination, staff will recommend that additional reporting, monitoring, or implementation efforts be required either through approval by the Executive Officer (e.g. pursuant to CWC section 13267 or section 13383) or by the Regional Board (e.g. through revisions of existing permits and/or a Basin Plan Amendment). Regional Board staff may conclude and articulate that to date, implementation efforts and results are likely to result in achieving the allocations and numeric target, in which case existing and anticipated implementation efforts should continue.

Three-year reviews will continue until the TMDL is achieved. The target date to achieve the TMDL is by the end of the NPDES permit life of the WRF following adoption of this TMDL.

11. TIMELINES MILESTONES AND COST

11.1. Timeline

Nitrate-N and potentially unionized ammonia loading from groundwater is likely. Groundwater movement is slow, relative to surface waters. In addition, the contribution of nitrate-N and unionized ammonia to the listed waterbodies is not quantifiable. As such, predicting when the TMDL will be achieved is based on best professional judgment, and not on data.

Staff predict that a period of ten to fifteen years will be required to achieve the allocations. This prediction is based on the fact that the largest proportion of nitrate loading is from irrigated agriculture. The implementation strategy to regulate the irrigated agriculture source relies on the Conditional Waiver. There are over 2000 growers in the lower Salinas watershed. It may take several years to get a significant number of growers involved in the Conditional Waiver Program.

11.2. Milestones

Milestones will be achieved when the following occur:

1. All regulated dischargers have effluent limits incorporated in permits and WDRs, as outlined in the implementation plan.
2. All M&RPs are amended to include required monitoring.
3. A majority of the existing growers are meeting the conditions of the Conditional Waiver.

REFERENCES

USEPA (United States Environmental Protection Agency). 2000. Nutrient Criteria Technical Guidance Manual; Rivers and Streams. EPA-822-B-00-002.

APPENDIX A: DATA ANALYSIS